departments; and, further, that the professional opinions of technical officers too frequently are not given the due weight which they deserve. Science has done much for the civil service; it has not, in return, received the recognition which it merits.—*Nature.*

SCIENTIFIC BOOKS

The Physical Chemistry of the Proteins. By T. Brailsford Robertson. New York, Longmans, Green and Co. Pp. 483. $5.00.

The limiting adjective "physical" might be omitted from the title of Robertson's new edition, so completely does it cover the field of protein chemistry. Part I., including the first third of the book, is devoted to the chemical constitution of the proteins, their preparation, methods of estimation, and the various types of compounds which they form with each other and with acids, bases, salts, heavy metals, etc. Part II. is devoted to the electro-chemistry of the proteins; Part III. to their physical properties, such as gelatinization, swelling, coagulation, viscosity and surface tension, not included under Part II.; and Part IV. to the hydrolytic and synthetic actions of enzymes on proteins. Throughout the work statements and discussions are placed on a quantitative basis by the use of mathematical treatment wherever data sufficiently complete and accurate to justify it are available. Biological applications are kept continually in view. Despite the fact that he covers so wide a field and thoroughly reviews the literature, the author seldom fails to augment the interest of his material by presenting it from a view-point developed from his own experimental and intellectual researches.

Donald D. Van Slyke

SPECIAL ARTICLES

UNLIKE REACTION OF DIFFERENT INDIVIDUALS TO FRAGRANCE IN VERBENA FLOWERS

In classifying the floral colors in a certain pedigree of verbenas, the writer noticed a considerable difference in the amount of fragrance evident in their flowers. Some plants appeared to have flowers devoid of odor while the flowers of others were strongly fragrant. One with pale pink flowers, which may be called plant *A*, was especially pleasing in this respect. In showing it to my assistant, Mr. B. T. Avery, Jr., I remarked that it should be called an arbutus verbena since the flowers resembled the arbutus in both color and odor. To my surprise he failed to find any fragrance at all in the flowers of this plant. Moreover, when he arranged the pedigree according to the strength of fragrance which they gave to him it was roughly in the reverse order from that in which I should have arranged them. The most fragrant of all to him was a red-flowered plant the flowers of which to me were absolutely without fragrance. This for convenience we may call plant *B*. The flowers of plant *B* then were fragrant to him but not to me while those of plant *A* were fragrant to me but not to him. Each of us agreed that the other's favorite had a very slight odor that could be best described as a leafy or plant odor which apparently was the same as that of the foliage. Moreover, he described the fragrance from plant *B* as of a spicy nature resembling that from a carnation flower to which I am not insensible, while the fragrance of plant *A* seemed to me to closely resemble that of arbutus, with which he is also familiar. It did not seem to be the case that we both perceived the same odors but, having different preferences, dignified the one which we liked with the term fragrant. Rather the facts indicated that he was insensible to the odors in the flowers of *A* while I was insensible to odors in those of *B*. We repeated the tests many times under various conditions with the same results. He never was able to perceive any fragrance from *A* while, except upon a few occasions when I detected a slight odor such as he had described, I was unable to find any fragrance in his favorite.

In addition to ourselves, others in the community were tested for their reaction to fragrance in our plants *A* and *B*. The later tests were made in October. Due perhaps to the lateness of the season or to other conditions, the few remaining flower clusters then produced by plant *A* were not always fragrant.

In making the tests, an *A* flower cluster that was fragrant to me was used in contrast with a *B* flower cluster that was adjudged fragrant by Mr. Avery or by one who had been found to react to it in the same manner in which he did. The person to be tested was asked to decide which of the two was the more fragrant. There was an amusing uniformity in the manner of response. The subject would generally say he feared he was not smelling well that day, would then blow his nose and almost at once pick out either *A* or *B* and wonder how any one could think the other fragrant. When questioned as to fragrance in the flowers that were not preferred, he would generally say they were not fragrant but had a slight odor variously described as being a plant odor or an odor like a dead leaf.

The pleasure obtained from odors is often closely bound up with other associated perceptions. For this reason, in some cases the individuals tested were asked to smell the flowers with their eyes closed. Color associations were shown to have no controlling influence in the reaction. In some instances the tests were repeated but without affecting the results.

Of the men, 17 preferred the flowers of *A* while 9 preferred those of *B*—a ratio of 2 to 1. Of the women, 9 preferred *A* while 4 preferred *B*. In general the results were clear-cut and the individuals tested found fragrance in one of the two flowers and not in the other. A few, however, found a slight fragrance in the flowers that they did not prefer and two women found fragrance in both and could not decide between them.

Flowers from the two plants were exhibited at a staff meeting of the Carnegie Station and were repeatedly smelled by the seven members present. Five found fragrance in A and not in *B* and two showed a reversed reaction.

It is a trite proverb that in matters of taste there can be no argument. The assumption is that though we differ in our preferences, our perceptions are essentially the same. In the case of the verbena flowers under discussion, however, it has been shown that preferences of different individuals in regard to fragrance are based upon radical differences in their perception of odors. The condition suggests color-blindness, but those who are color-blind react to both of two colors when they are unable to distinguish between them. About two thirds of the individuals tested with the verbena flowers were "blind" to odors in the flowers of plant *B* while perceiving odors in *A*. On the other hand, about one third were "blind" to odors in *A* while perceiving odors in *B*. It is as if my black looked white and my white, black to Mr. Avery and his group; while from his viewpoint, I and the group that agreed with me were equally distorted in our vision.

It is well known that people differ considerably in their ability to hear tones of higher musical pitch. Many can not hear the notes of the cricket. Other insects produce sound vibrations of so high a pitch that they are inaudible to any human ear, though perceived by related insects. The peculiarity in the perception of the verbena fragrance might resemble the individual peculiarities in the powers of hearing if it were true that a large group of people could hear the extremely high musical notes and not the lowest tones while another group could hear the lowest and not the highest.

The acts brought out in the foregoing discussion furnish an added example of the difficulty in classifying characters studied in inheritance. A group of different individuals in investigating fragrance in our pedigree of verbenas would be classifying their own olfactory perceptions as well as the actual odors in the flowers. It is well for us to recognize the limitations of the personal equation. Discrepancies in conclusions reached by different investigators may not be due to any fault in logical reasoning or to lack of intellectual honesty. Their diverse conclusions may be inevitable, given only differences in their sensory reactions and in their mental experience.

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THE WHITE-SPOT DISEASE OF ALFALFA

FOR a number of years the writer has observed the white-spot disease of alfalfa, par-